DEC 6 1990

FLOOD INSURANCE STUDY

TOWN OF OWENS CROSS ROADS ALABAMA

MADISON COUNTY

FEBRUARY 6, 1991

Federal Emergency Management Agency

COMMUNITY NO. - 010218

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Owens Cross Roads, Madison County, Alabama, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the Town of Owens Cross Roads to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the Tennessee Valley Authority for the Federal Insurance Administration, under Interagency Agreement No. IAA-H-15-78, Project Order 1. This study was completed in June 1979.

1.3 Coordination

A search for basic data was made in the Tennessee Valley Authority (TVA), files. These files include records from the various agencies that have maintained flow or stage records of Flint River at or near Owens Cross Roads, Alabama, from 1867 to the present.

Streams requiring detailed study were identified at a time and cost coordination meeting attended by representatives of TVA, FIA, and Owens Cross Roads in December 1977. The only significant flooding source is the Flint River.

Additional flood information concerning the Flint River was obtained from TVA reports containing results of interviews with local citizens, newspaper file searches, and field investigations conducted by TVA engineers during and following recent, important floods.

On March 10, 1980, the results of the study were reviewed at the final coordination meeting attended by representatives of TVA, FIA, and community officials.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Owens Cross Roads, Alabama. The area of study is shown on the Vicinity Map (Figure 1).

The limits of detailed and approximate studies in Owens Cross Roads were determined by FIA with community and study contractor consultation at the meeting in December 1977.

Flooding caused by overflow of the Flint River from mile 7.70 to 12.06 was studied in detail. Flooding on the remaining reach of the Flint River affecting Owens Cross Roads was studied by approximate methods.

Approximate methods of analyses were used to study those areas having a low development potential or minimal flood hazard.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through June 1984.

2.2 Community Description

The Town of Owens Cross Roads is situated in Madison County, Alabama, approximately 12 miles southeast of Huntsville, Alabama. In 1970, the population of Owens Cross Roads was 767 persons (Reference 1). The July 1, 1975 population estimate was 731 (Reference 2), down 4.7 percent since 1970.

The 1978 assessed valuation of the town was $407,040. In 1977, there were 236 manufacturing firms in Madison County, employing approximately 19,700 workers with annual payroll in excess of $228 million (Reference 3).

Owens Cross Roads is located on the east bank of the broad flood plain of the Flint River. The elevations vary from about 570 to about 590 feet above National Geodetic Vertical Datum of 1929 (NGVD).

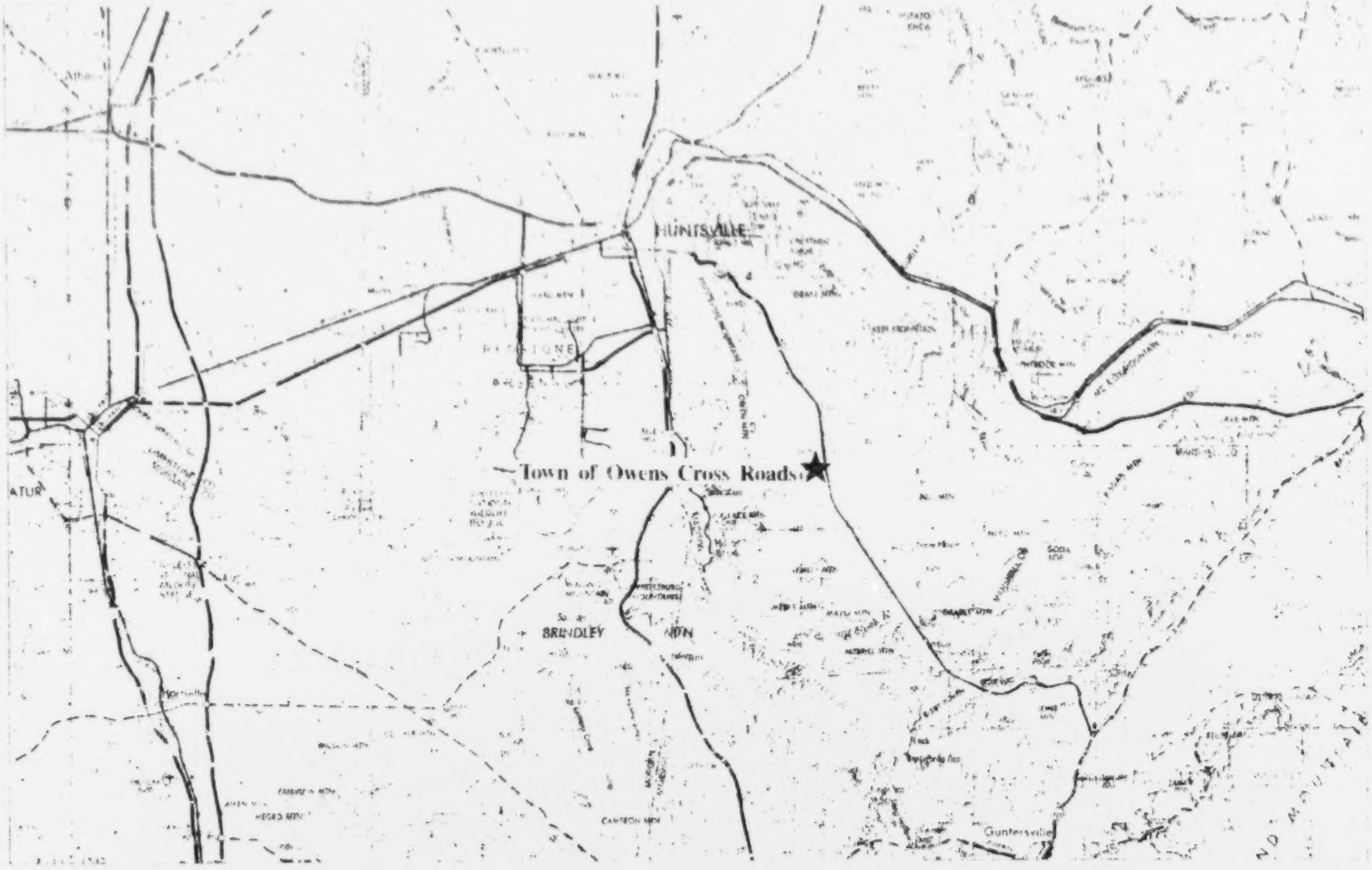


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF OWENS CROSS ROADS, AL
(MADISON CO.)

APPROXIMATE SCALE

6 0 6 12 18 MILES

VICINITY MAP

REVISED 2-91

The Flint River, rising in Tennessee, flows southward into Madison County through broad valleys (Reference 4). Its total drainage area is 339 square miles and includes most of the north-central, northeast, and east-central part of the county.

Owens Cross Roads has a mild, temperate climate. The average annual temperature is 62 degrees F. The average summer temperature is 80 degrees F, and the average winter temperature is 46 degrees F. At nearby Huntsville the highest recorded temperature is 106 degrees F, the lowest is minus 7 degrees F.

The average annual precipitation is about 52 inches. Heavy rains generally occur between December and April. Periods of low rainfall occur in August and September (Reference 4).

2.3 Principal Flood Problems

The principal source of flooding in Owens Cross Roads is the Flint River.

The largest flood known to have occurred on the Flint River since 1867 was that of March 16, 1973. The flood reached elevation 586.6 feet NGVD at mile 10.25 with recurrence interval of approximately 200 years.

Almost every resident of the community had to be evacuated, but there were no deaths. Tabor Egg Farm lost 22,000 chickens in this flood. The chickens were loaded for market in a trailer truck that got caught in the flood. Steve and Bob Baker Hardware store was flooded, ruining a major portion of the their merchandise. Old U.S. Highway 431 through Owens Cross Roads was inundated for more than 24 hours (Reference 5).

The flood of March 12, 1963, was a major one. About 50 houses were abandoned and several businesses had flood damages. Ben C. Tabor had 6,000 laying hens out of a flock of 8,000 drowned (Reference 6). No flood discharge or elevation information is available.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods

of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

The USGS gaging station No. 03575000 (Reference 7) on Flint River near Chase was the principal source of data for defining discharge-frequency relationships for Flint River. The gage has been in operation since 1929. A flood frequency relationship was developed from the record using the procedure outlined in Bulletin 17A (Reference 8) including the skew map, plate 1, and adjustment for available historic information. The transfer of the discharge-frequency relationships downstream were determined by comparison with the available historical flood profiles.

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLINT RIVER					
Mile 7.4	542	29,000	54,000	66,000	109,000
Mile 10.25	530	29,500	54,500	67,000	110,000
Mile 12.08	517	31,000	56,000	69,000	111,000

Downstream decreases in peak discharges because of channel storage.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

Water-surface elevations were computed through use of the Corps of Engineers HEC-2N backwater program (Reference 9). The natural ground sections were obtained by photogrammetric methods using aerial photographs at a scale of 1" = 800'. Cross sections were selected at sufficiently close intervals to enable water-surface elevations to be computed accurately.

Channel and overbank roughness factors (Manning's "n") were determined by field inspection of channel and flood plain areas from previous studies by TVA and from computed coefficients based on known flood profiles. The ranges of values for Manning's "n" were from 0.04 to 0.06 for the channel and 0.11 to 0.125 for the overbank area.

Flood profiles were drawn showing water-surface elevations to an accuracy of 0.5 foot (Exhibit 1). Starting water-surface elevations for the headwater floods on Flint River were obtained by slope-area calculation. Since Madison County was studied concurrently with Owens Cross Roads, the Flint River study was started downstream of Owens Cross Roads. The controlling elevations at the lower end of the Flint River were computed by joint probability between the Tennessee River flood elevations and the Flint River headwater flood elevations.

All elevations are measured from NGVD; elevation reference marks used in the study are shown and described on the maps.

The flood elevations as shown on the profiles are considered valid only if hydraulic structures in general remain unobstructed, operate properly, and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated by photogrammetric methods using aerial photographs at a scale of 1" = 800'. In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the stream reach studied by approximate methods, the depth of the 100-year flood was developed from normal depth calculations and was outlined on a 7.5-minute quadrangle map with a contour interval of 10 feet, expanded photogrammetrically to a scale of 1" = 500' (Reference 10).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway proposed for this study was computed by setting encroachments in the stream overbanks, testing these with the backwater program, and adjusting and retesting them until an allowable increase in flood elevation is reached. This procedure has been used by TVA for many years to provide technical flood plain management assistance to Tennessee Valley communities.

In this procedure the floodway limit lines are located to allow use of some presently flood-prone areas at the expense of some increase in flood levels. The limit lines are located in a manner which provides land where it is estimated to serve the community's needs best. The results of these computations are tabulated at selected cross sections for each stream studied (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections the boundaries were interpolated.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
FLINT RIVER								
A	8.66	3960[2]	39,812	1.7	581.3	580.9[4]	581.9	1.0
B	9.09	3700[3]	37,124	1.8	582.3	582.3	583.2	0.9
C	9.65	5000[3]	45,912	1.5	583.8	583.8	584.5	0.7
D	10.20	4850[3]	44,735	1.5	585.2	585.2	586.0	0.8
E	10.50	5150[3]	50,281	1.3	585.9	585.9	586.7	0.8
F	10.61	5060[3]	48,509	1.4	586.3	586.3	587.0	0.7
G	12.06	4750[3]	53,692	1.3	586.6	586.6	587.4	0.8
H	12.08	4750[3]	54,691	1.3	587.2	587.2	588.2	1.0

[1]MILES ABOVE MOUTH
[2]THIS WIDTH IS BEYOND CORPORATE LIMITS
[3]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS
[4]ELEVATIONS WITHOUT CONSIDERING OVERFLOW EFFECT FROM TENNESSEE RIVER

REVISED: 2/6/91

TABLE 2

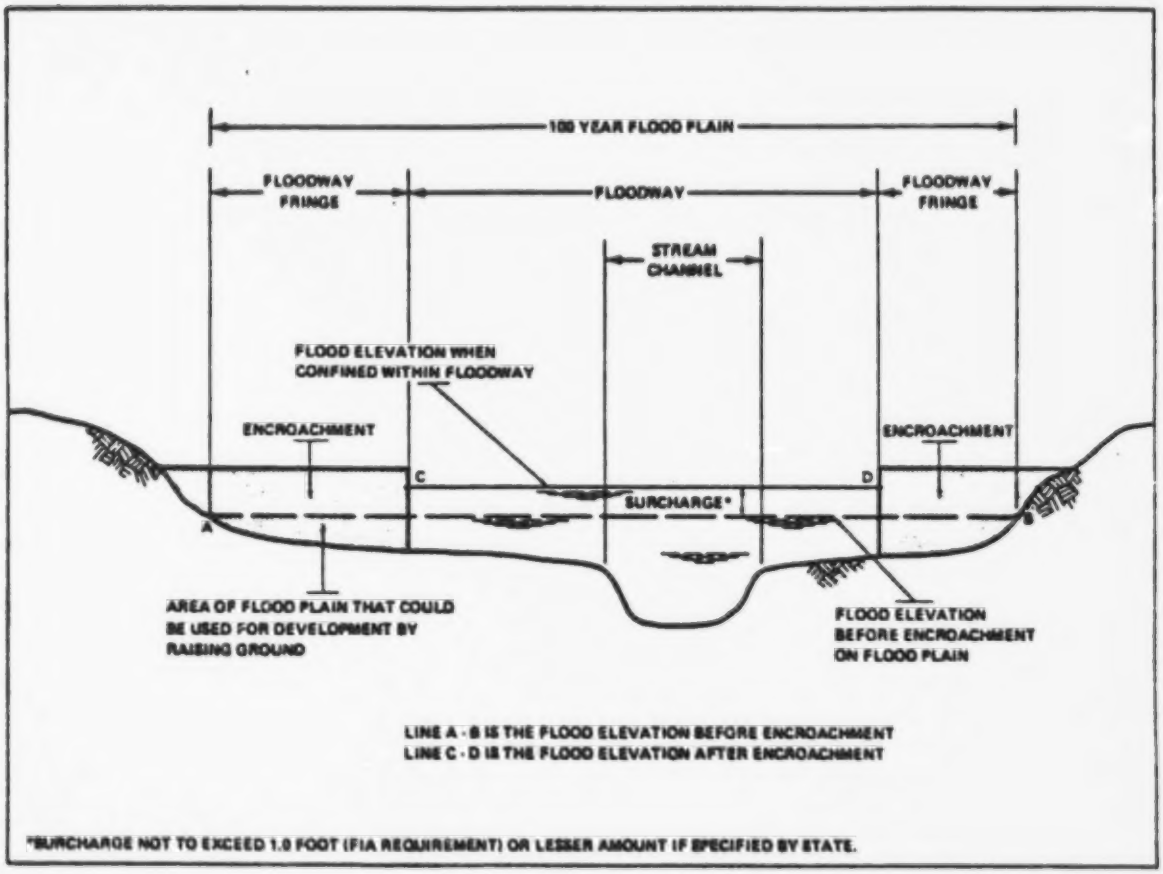
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF OWENS CROSS ROADS, AL
(MADISON CO.)

FLOODWAY DATA

FLINT RIVER

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the Town of Owens Cross Roads.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

One reach meeting the above criteria was required for the Flint River at the Town of Owens Cross Roads. The location of the reach is shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Town of Owens Cross Roads was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zone A7:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the Flint River.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Owens Cross Roads is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

A FIS is currently being conducted for the unincorporated areas of Madison County, which surrounds Owens Cross Roads. The results of that study were coordinated with those for Owens Cross Roads.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100 YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Flint River Reach 1	0001	-3.7	-1.2	+3.2	035	A7	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT-SEE MAP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWN OF OWENS CROSS ROADS, AL
(MADISON CO.)

FLOOD INSURANCE ZONE DATA

FLINT RIVER

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, 1375 Peachtree Street, N.E., Atlanta, Georgia 30309.

8.0 BIBLIOGRAPHY AND REFERENCES

1. U.S. Bureau of the Census, "Census of Population," 1970, Characteristics of the Population, Alabama.

2. U.S. Bureau of the Census, "Current Population Reports, Population Reports, Population Estimates and Projections," Series P-25, Alabama, July 1976.

3. U.S. Department of the Census, "Census of Retail Trade," 1972, Alabama.

4. Geological Survey of Alabama, "Geology and Ground Water Resources of Madison County, Alabama," 1957.

5. Tennessee Valley Authority, "Floods of 1973 in the Tennessee River Basin," Report No. 0-7129, Division of Water Control Planning, Knoxville, Tennessee, June 1974.

6. Tennessee Valley Authority, "Floods of March 1963 in the Tennessee River Basin," Report No. 0-6425, Volume I, Division of Water Control Planning, Knoxville, Tennessee, January 1964.

7. U.S. Geological Survey, "Water Resources Data for Alabama," Annual Reports, 1934-1977.

8. Water Resources Council, "Guidelines for Determining Flood Flow Frequency," Bulletin 17A, June 1977.

9. U.S. Army Corps of Engineers, HEC-2N Water-Surface Profiles, TVA Modified Version of the Generalized Computer Program, Hydrologic Engineering Center, Davis, California, November 1976, updated August 1977.

10. U.S. Department of the Interior, Geological Survey, "7.5-Minute Series (Topographic) Map," Scale 1:24,000, Contour Interval 10 Feet, New Hope, Alabama, 1973.

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To ensure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the City Clerk's Office, P.O. Box 158, Owens Cross Roads, Alabama.

9.1 First Revision (Revised February 6, 1990)

a. Acknowledgments

The hydrologic and hydraulic analyses for this Revisions Description were performed by the Tennessee Valley Authority (TVA). The Federal Emergency Management Agency reviewed and accepted these data for purposes of this revision.

b. Scope

The floodplain boundaries, base flood elevations, zone designations, and floodway were revised along the Flint River within the community (from River mile 12.06 to 12.76). The corporate limits were also revised.

c. Hydrologic and Hydraulic Analyses

Discharge frequency for the study reach of the Flint River from miles 12.06 to 21.79 was determined from linear interpolation by river mile between discharge frequency at mile 12.06 (the previous upstream study limit) and discharge frequency at U.S. Geological Survey (USGS) stream gage No. 0357500 at mile 35.9. Discharge frequency at the stream gage site was estimated from records from 1929 to 1987 using procedures outlined by the U.S. Water Resources Council (Reference 11). To verify the adopted discharge frequency, the frequencies of highwater marks from floods of July 1936, January 1946, January 1949, January 1954, and March 1973 within the study reach were determined from computed frequency profiles. These frequencies were consistent with frequencies of the same floods at the upstream gaging station, thus supporting the adopted discharge frequency for the study reach. The discharges used in the revision are shown in Table 4, Revised Summary of Discharges. The downstream decrease in discharges is caused by channel and floodplain storage in the reach.

TABLE 4 - REVISED SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (cfs)*			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
FLINT RIVER					
at Mile 12.06	517	31,000	56,000	69,000	111,000
at Mile 17.75	476	32,850	58,910	72,440	114,440
at Mile 21.79	470	34,000	60,720	74,580	116,580

*cfs - cubic feet per second

The HEC-2 step-backwater computer program (Reference 12) was used to determine water-surface elevations. Roughness coefficients (Manning's "n") were estimated from field investigation and adjusted based on floodmarks. The "n" values used in the HEC-2 analyses ranged from .025 to .065 for the channel and from 0.06 to 0.17 for the overbanks. Cross sections were obtained by field survey. Flood boundaries were delineated using topographic maps at a scale of 1:24000 with a contour interval of 20 feet (Reference 13).

d. Floodways

Floodway computations for the Flint River were revised as a result of new detailed analyses performed by the TVA.

The floodways for this study were designed for optimum benefit to the community. Floodway analyses were based on equal conveyance reduction and adjusted as necessary to account for the effects of existing development and to provide functional and manageable floodways. The results of those computations were tabulated at selected cross sections for each stream segment for which a floodway was revised and are presented in Table 2, Floodway Data.

e. Insurance Application

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed

hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

The reach determinations, Flood Hazard Factors, and flood insurance zones presented in Sections 5.1, 5.2, and 5.3 of this report and Table 3, Flood Insurance Zone Data, are no longer applicable.

f. Flood Insurance Rate Map

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones are described in Section 9.1e and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

g. Other Studies

The Flood Insurance Study for the Unincorporated Areas of Madison County, Alabama (Reference 14) is also being revised based on the new TVA analyses. That revised study will be in agreement with this revision.

h. References and Bibliography

11. U.S. Water Resources Council, Guidelines for Determining Flood Flow Frequency, Washington, D.C., Bulletin 17B, of the Hydrology Committee, 1981, revised 1982.

12. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program, Davis, California, November 1976, updated April 1980.

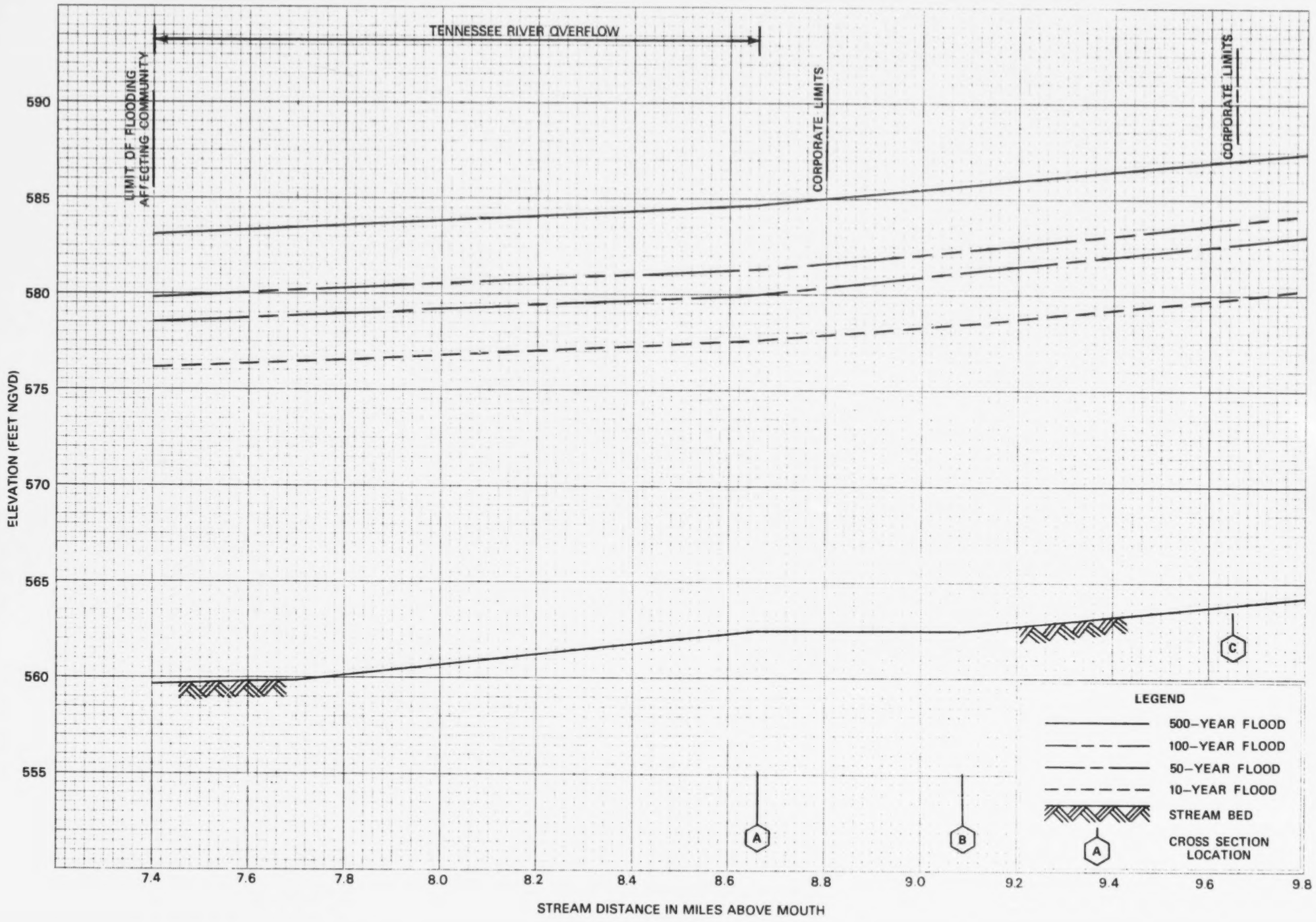
13. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, contour interval 20 Feet: New Hope, Alabama, 1959, photorevised 1973; Moontown, Alabama, 1948, photorevised 1974.

14. Federal Emergency Management Agency Flood Insurance Study, Madison County, Unincorporated Areas, Alabama, February 1991.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	587.88	TVA bronze tablet stamped "RAS 472 1946" in concrete post 38 feet southwest of intersection of old U.S. Highway 431 and Cave Spring Road, 0.1 foot lower than highway steel fencepost with marker set 1 foot east of monument
2*	0001	579.80	chiseled square on upstream left abutment of Carpenter bridge across the Flint River
3	0001	581.32	USGS bronze tablet stamped "TT C-19-1935" in concrete post 77 feet east from old U.S. Highway 431, 106 feet south from driveway to school building, 189 feet west from northwest corner of school building, steel fencepost with marker set 1 foot west of monument
4	0001	578.47	TVA bronze tablet stamped "RAS-474-1946" in concrete post at bend in old U.S. Highway 431 and Y-road south, 60 feet west of centerline of Highway, 1.3 miles north of Buggs Chapel
5	0001	583.4	railroad spike set in power pole 2.6 feet above ground, 19 feet south of centerline of old Big Cover Road and 24 feet east of old U.S. Highway 431
6*	0001	590.8	chiseled "X" on northwest corner of Big Cove Road bridge over the Flint River

*Outside Corporate Limits



FLOOD PROFILES

FLINT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF OWENS CROSS ROADS, AL
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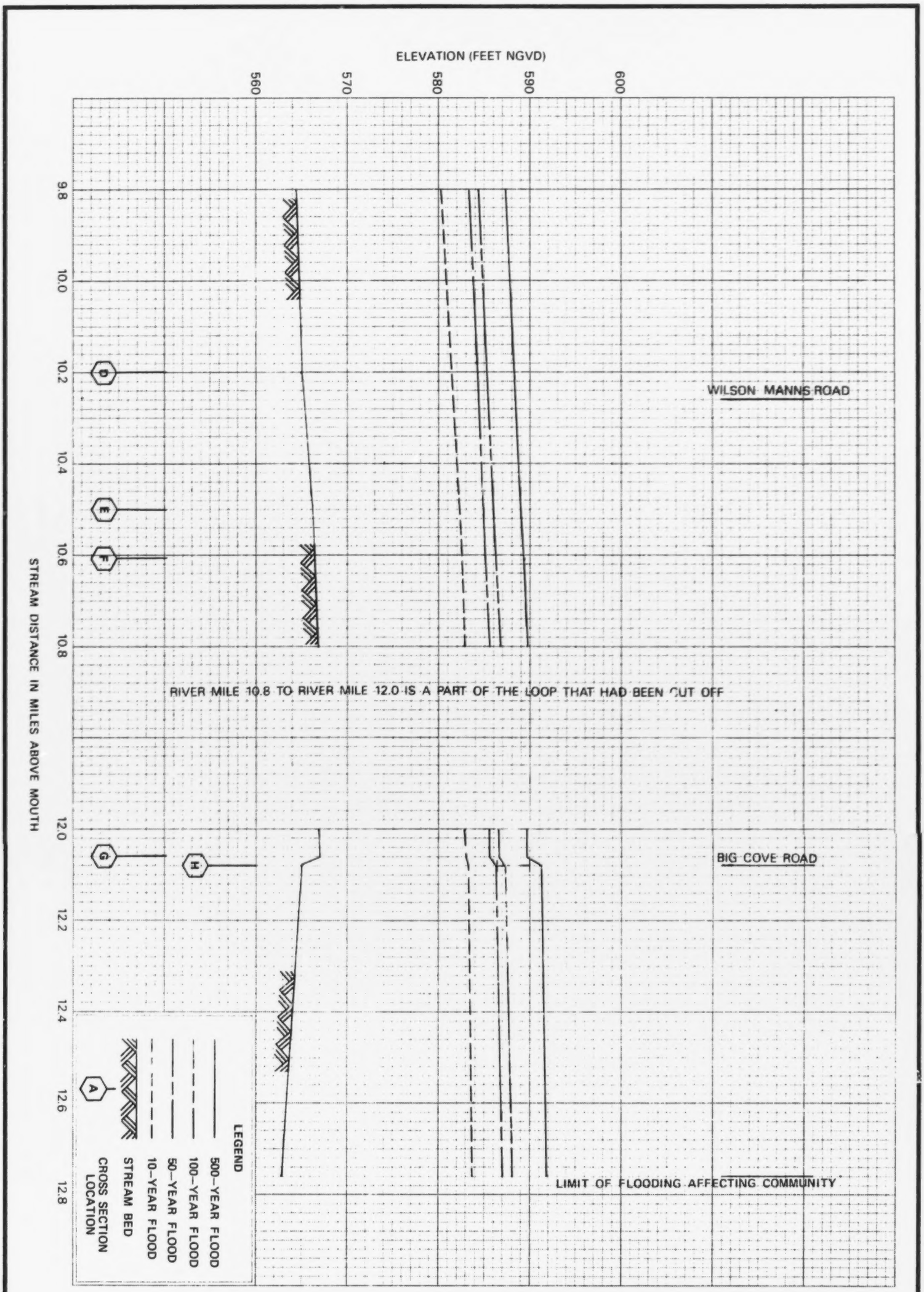

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